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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE#10
03/28/03
AS

In re application of:

Yoshiaki Hirano et al.

Serial No.: 09/880,876

Art Unit: 1713

Filed: June 15, 2001

Examiner: WILSON, DONALD R

Title: CROSSLINKED POLYMER,
METHOD FOR MANUFACTURING
IT AND USE THEREOFDECLARATION UNDER RULE 132Honorable Commissioner of Patents and Trademarks,
Washington, D.C. 20231

Sir:

I, Yoshiaki Hirano, a citizen of Japan and having
postal mailing address of 9-9-109,
Wakayamacho, Nishinomiya-shi, HYOGO 663-8016 JAPAN,
declare and say that:

March, 1995, I was graduated from Tokyo Institute of
Technology and received a Master of Engineering;

From April, 1995, up till the present, I have been
employed by Nippon Shokubai Co., Ltd., and engaged in the
works of Strategic Technology Research;

I am one of the inventors of the above-identified
application and am familiar with the subject matter
thereof;

I have read the Office Action mailed and the
references cited therein and am familiar with the subject
matter thereof;

I respectfully submit herewith my exact report
thereon;

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Experiment for showing of the criticality for the claimed crosslinked polymer having the crosslink structure of general formula (1) as compared with the compositions disclosed in JP'528

<Preparation of polymers>

The claimed crosslinked polymer having the crosslink structure of general formula (1) was prepared by the polymerization of diallyldimethylammonium chloride (DADMAC) with N,N,N',N'-tetraallyldipiperidylpropanium dichloride (TADFFC), and the composition disclosed in JP'528 was prepared by the polymerization of dialkyldiallylammonium chloride with N,N,N',N'-tetraallylpiperazine dichloride.

These preparations were conducted by the catalyst preparation method in the manner as recited in the present description of page 79, line 5 hereinafter.

The mole ratio of diallyldimethylammonium chloride and the crosslinking agent is 9/1 in both preparations.

<Comparison between the claimed polymer and the composition disclosed in JP'528>

It was practiced by synthesizing hydroxypropyl acrylate (HPA) from acrylic acid (AA) and propylene oxide (PO) by means of the crosslinked polymer used as a catalyst. This reaction is described on page 62, lines 3-9 of the present description.

The reaction conditions were as follows (1)-(4).

- (1) The reaction substances were acrylic acid (AA) and propylene oxide (PO) as mentioned above.
- (2) The amount of the catalyst was 10 % by weight relative to acrylic acid.

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(3) The mole ratio of propylene oxide (PO)/ acrylic acid (AA) was 1.2.

(4) The reaction was conducted at 70 °C for 4 hours.

<Testing result>

Testing results of the conversion and the selectivity were shown in following table.

Crosslinked polymer	Tetraallyl compound (Crosslinking agent)	Acrylic acid (AA) conversion	Selectivity toward hydroxypropyl acrylate (HPA)
Present invention	N,N,N',N'-tetraallyl -dipiperidylpropanium dichloride (TADPPC)	77.8%	87.0%
JP'528	N,N,N',N'-tetraallyl piperazine dichloride	59.7%	81.4%

The comparative test data clearly showed that the reaction by means of the claimed crosslinked polymer possessed unexpectedly improved reactivity which the composition of the prior art did not have, therefore, it was demonstrated that there was the criticality for the claimed crosslinked polymer having the crosslink structure of general formula (1) as compared with the compositions disclosed in JP'528.

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I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed this 26 th day of February , 2003

Yoshiaki Hirano

Yoshiaki Hirano